

IN THE CLAIMS:

Claims 1, 2, 6, 11, 17, 23, 31, 40, 45, and 51 have been amended. Claims 35-39 have been canceled. Claims 57-58 have been added. A listing of claims follows:

1. (Currently Amended) A computer implemented method comprising:
determining, by a process state manager, a process' state, the determining
including determining expiration of a time period to receive a heartbeat
message when the process dies; and
indicating from ~~a~~the process state manager to a plurality of processes changes
in the process' state.
2. (Currently Amended) The computer implemented method of claim 1
wherein the determining the process' state comprises:
receiving a request for a communication key when the process starts and
restarts; ~~and~~
~~determining expiration of a time period for receiving a heartbeat message when~~
~~the process dies.~~
3. (Original) The computer implemented method of claim 1 further comprising
registering interest of the plurality of processes in the process.
4. (Original) The computer implemented method of claim 1 further comprising
managing a communication key for the process and a plurality of communication keys
for the plurality of processes.

5. (Original) The computer implemented method of claim 1 further comprising the plurality of processes communicating with the process with a communication key.

6. (Currently Amended) A computer implemented method performed by a process state manager, the method comprising:

registering interest of a first process in a second process;

determining the second process' state by processing a heartbeat from the second process; and

notifying the first process when the second process changes state.

7. (Original) The computer implemented method of claim 6 wherein the second process' state is either alive, dead, or unregistered.

8. (Original) The computer implemented method of claim 6 wherein the notifying the first process comprises:

transmitting a death notification when the second process dies; and

transmitting a birth notification when the second process starts or restarts.

9. (Original) The computer implemented method of claim 6 further comprising: providing the second process a communication key when the second process starts; and

transmitting the communication key to the first process.

10. (Original) The computer implemented method of claim 6 further comprising the first process communicating with the second process with a communication key.

11. (Currently Amended) A computer implemented method comprising:

determining a first process has started;
providing the first process a communication key;
maintaining the communication key and the first process' state based on a heartbeat of the first process; and
transmitting the communication key to a second process.

12. (Original) The computer implemented method of claim 11 wherein determining the first process has started comprises receiving a request for the communication key from the first process.

13. (Original) The computer implemented method of claim 11 wherein the communication key includes a process identifier and a incarnation identifier.

14. (Original) The computer implemented method of claim 11 wherein maintaining the communication key comprises creating a unique process identifier when the first process initially starts and updating an incarnation identifier part of the communication key each time the first process restarts.

15. (Original) The computer implemented method of claim 11 further comprising registering interest of the second process in the first process.

16. (Original) The computer implemented method of claim 11 further comprising the second process communicating with the first process with the communication key.

17. (Currently Amended) A computer implemented method comprising:
receiving a request for a communication key of a first process from a second process;

determining the first process' state;

if the first process is determined alive by receipt of a heartbeat message prior to expiration of a timer, then transmitting the communication key for the first process to the second process;

if the first process has not started, then indicating to the second process the communication key is not available;

receiving a message when the first process starts;

providing the communication key to the first process; and

transmitting the communication key to the second process.

18. (Original) The computer implemented method of claim 17 wherein the communication key includes a process identifier and an incarnation identifier.

19. (Original) The computer implemented method of claim 17 wherein the communication key includes an incarnation identifier that is updated each time the first process restarts.

20. (Original) The computer implemented method of claim 17 further comprising registering interest of the second process in the first process.

21. (Original) The computer implemented method of claim 17 further comprising transmitting a death notification to the second process when the first process dies.

22. (Original) The computer implemented method of claim 17 further comprising the second process communicating with the first process with the communication key.

23. (Currently Amended) An apparatus comprising:

a processor to execute a process state manager, a first process, and a second process, the process state manager to maintain a first communication key for the first process and a second communication key for the second process and to communicate state changes between the first process and the second process based at least in part on a first heartbeat of the first process and a second heartbeat of the second process; and
a memory coupled to the processor, the memory to store a first state for the first process and a second state for the second process, the first communication key and the second communication key.

24. (Original) The apparatus of claim 23 wherein the communication key includes a process identifier and an incarnation identifier.

25. (Original) The apparatus of claim 23 further comprising a second processor to execute a third process, the third process to communicate with the first process and to register with the process state manager.

26. (Original) The apparatus of claim 23 wherein the process state manager to maintain the first communication key comprises the process state manager to update an incarnation identifier of the first communication key each time the first process restarts.

27. (Original) An apparatus comprising:
a first processor to host a process state manager, the process state manager to maintain a communication key and a state for a process; and
a second processor coupled to the first processor, the second processor to host the process, the process to periodically transmit heartbeat messages to the process state manager on the first processor.

28. (Original) The apparatus of claim 27 wherein the communication key includes a process identifier and an incarnation identifier.

29. (Original) The apparatus of claim 27 further comprising the first processor to host a second process, the second process to request a second communication key from the process state manager.

30. (Original) The apparatus of claim 27 further comprising the first processor to host a second process, the second process to use a second communication key provided by the process state manager to communicate with the process.

31. (Currently Amended) A machine-readable medium that provides instructions, which when executed by a set of processors of one or more processors, cause said set of processors to perform operations comprising:

transmitting a request to a process state manager for a first communication key;

receiving the first communication key;

transmitting signals to the process state manager;

requesting from the process state manager a second communication key for a process;

if the second communication key is provided because a heartbeat message of the process has been received by the process state manager before a timer expires, then communicating with the process with the second communication key;

if the second communication key is not provided, then requesting notification from the process state manager when the second communication key is

available based on a registration of the process with the process state manager.

32. (Original) The machine-readable medium of claim 31 wherein the first communication key includes a first process identifier and a first incarnation identifier and the second communication key includes a second process identifier and second incarnation identifier, the second process identifier and the second incarnation identifier corresponding to the process.

33. (Original) The machine-readable medium of claim 31 further comprising requesting a third communication key to communicate with a third process.

34. (Original) The machine-readable medium of claim 31 further comprising receiving a death notification when the process dies.

35. (Canceled)

36. (Canceled)

37. (Canceled)

38. (Canceled)

39. (Canceled)

40. (Currently Amended) A machine-readable medium that provides instructions of a process state manager, which when executed by a set of processors of

one or more processors, cause said set of processors to perform operations comprising:

registering interest of a first process in a second process;
determining the second process' state by processing a heartbeat from the second process; and
notifying the first process when the second process changes state.

41. (Original) The machine-readable medium of claim 40 wherein the second process' state is either alive, dead, or unregistered.

42. (Original) The machine-readable medium of claim 40 wherein the notifying the first process comprises:

transmitting a death notification when the second process dies; and
transmitting a birth notification when the second process starts or restarts.

43. (Original) The machine-readable medium of claim 40 further comprising:
providing the second process a communication key when the second process starts; and
transmitting the communication key to the first process.

44. (Original) The machine-readable medium of claim 40 further comprising the first process communicating with the second process with a communication key.

45 (Currently Amended) A machine-readable medium that provides instructions, which when executed by a set of processors of one or more processors, cause said set of processors to perform operations comprising:
determining a first process has started;

providing the first process a communication key;
maintaining the communication key and the first process' state based on a heartbeat of the first process; and
transmitting the communication key to a second process.

46. (Original) The machine-readable medium of claim 45 wherein determining the first process has started comprises receiving a request for the communication key from the first process.

47. (Original) The machine-readable medium of claim 45 wherein the communication key includes a process identifier and a incarnation identifier.

48. (Original) The machine-readable medium of claim 45 wherein maintaining the communication key comprises creating a unique process identifier when the first process initially starts and updating an incarnation identifier part of the communication key each time the first process restarts.

49. (Original) The machine-readable medium of claim 45 further comprising registering interest of the second process in the first process.

50. (Original) The machine-readable medium of claim 45 further comprising the second process communicating with the first process with the communication key.

51. (Currently Amended) A machine-readable medium that provides instructions, which when executed by a set of processors of one or more processors, cause said set of processors to perform operations comprising:

receiving a request for a communication key of a first process from a second process;
determining the first process' state;
if the first process is determined alive by receipt of a heartbeat message prior to expiration of a timer, then transmitting the communication key for the first process to the second process;
if the first process has not started, then indicating to the second process the communication key is not available;
receiving a message when the first process starts;
providing the communication key to the first process; and
transmitting the communication key to the second process.

52. (Original) The machine-readable medium of claim 51 wherein the communication key includes a process identifier and an incarnation identifier.

53. (Original) The machine-readable medium of claim 51 wherein the communication key includes an incarnation identifier that is updated each time the first process restarts.

54. (Original) The machine-readable medium of claim 51 further comprising registering interest of the second process in the first process.

55. (Original) The machine-readable medium of claim 51 further comprising transmitting a death notification to the second process when the first process dies.

56. (Original) The machine-readable medium of claim 51 further comprising the second process communicating with the first process with the communication key.

57. (New) A network apparatus, comprising:

- a plurality of network processes, including a BGP process, each of the plurality of network processes to,
 - generate a registration request message upon birth,
 - receive communication keys for direct communication between the plurality of network processes,
 - express interest in other ones of the plurality of network processes, and
 - generate periodic heartbeat messages while active; and
- a configuration manager to,
 - register each of the plurality of network processes responsive to each of the registration request messages,
 - provide the communication keys to the plurality of network processes,
 - record the expressed interest of the plurality of network processes in other ones of the plurality of network processes,
 - detect each of,
 - birth of any of the plurality of network processes based on the registration request messages,
 - death of any of the plurality of network processes based on an absence of receipt of their heartbeat messages, and
 - restart of any of the plurality of network processes that previously registered based on a completion signal from that network process indicating that it has restarted, and
 - notify, upon detection of birth, death and/or restart of any of the plurality of network processes, those of the other of the plurality of network processes that expressed interest.

58. (New) The network apparatus of claim 57, wherein the communication keys include an incarnation identifier and a network process identifier, and wherein the configuration manager is also to, responsive to detection of restart of any of the plurality of network processes, provide an updated communication key that has an updated incarnation identifier and that has the same process identifier from the communication key previously provided to the restarted network process.